

## – New Worlds / New Horizons Science with an X-ray Astrophysics Probe

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In 2013 NASA commenced a design study for an X-ray Astrophysics Probe to address the X-ray science goals and program prioritizations of the Decadal Survey New World New Horizons (NWNH) with a cost cap of ~ \$1B. Both the NWNH report and 2011 NASA X-ray mission concept study found that high-resolution X-ray spectroscopy performed with an X-ray microcalorimeter would enable the most highly rated NWNH X-ray science. Here we highlight some potential science topics, namely: 1) a direct, strong-field test of General Relativity via the study of accretion onto black holes through relativistic broadened Fe lines and their reverberation in response to changing hard X-ray continuum, 2) understanding the evolution of galaxies and clusters by mapping temperatures, abundances and dynamics in hot gas, 3) revealing the physics of accretion onto stellar-mass black holes from companion stars and the equation of state of neutron stars through timing studies and time-resolved spectroscopy of X-ray binaries and 4) feedback from AGN and star formation shown in galaxy-scale winds and jets. In addition to these high-priority goals, an X-ray astrophysics probe would be a general-purpose observatory that will result in invaluable data for other NWNH topics such as stellar astrophysics, protostars and their impact on protoplanetary systems, X-ray spectroscopy of transient phenomena such as high-*z* gamma-ray bursts and tidal capture of stars by massive black holes, and searches for dark matter decay.